Processing 1.3 GHz 9-cell Cavities under FNAL MOU (Aug 15th 05)

2-1-06
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Goals of the MOU:

A. Commission the Jlab EP and HPR processing system and vertical test system for processing and test of 1.3 GHz 9-cell TESLA cavities (1 or 2 provided for commissioning)
B. Carry out processing of cavities coming from a variety of sources
C. Develop the processing parameters through iteration of the processing and test steps
D. Carry out detailed test program planning for individual cavities and evaluation of results
E. Carefully maintain a log and data base of process and test parameters and as many other environmental parameters for correlation with test results
F. Develop more cost effective procedures with high success rate yield
G. Develop written procedures and proposals for future improvements and toward industrial transfer
H. Provide or process samples as appropriate for the SCRF materials program at FNAL

A. Phase A – Initial tuning, baking, and surface removal
B. Phase B – EP and vertical dewar testing
C. Phase C – Helium vessel & cold coupler attachment and preparation for horizontal test

Deliverables

A. If funding is available, complete scope of work for four Phase A cycles within 2 months of receipt
B. If funding is available, complete scope of work for four Phase B cycles within 2 months of completion of Phase A or receipt of the cavities, if the Phase A work has been carried out elsewhere.
C. If funding is available, complete scope of work for four Phase C cycles within 2 months of completion of Phase B or receipt of the cavities, if the Phase B work has been carried out elsewhere.

Note: does this still make since and how does it address the goals of the MOU

Where do we stand at Jlab:

- Money is now available for this project as of today (175K)
- Some work on tooling has taken place
  - One set of chemistry and testing flanges were fabricated, a second set is needed

- A design for mounting the 9-cell cavity into an SNS alignment cage is complete
- A prototype rotary sleeve is being fabricated for the EP setup
- Cabinet plumbing modifications are almost complete

What should happen by end of March:

- Complete a detailed design for 9-cell mounting into EP Alignment frame
  - Complete design work
  - Complete CAD Drawings
  - Mount and leak test the prototype rotary sleeve

- Mount the S35 9-cell cavity (one with HOM's) into the SNS cage develop alignment scheme and walk cavity thru process stations
  - Insertion into degreasing station
  - HPR fit-up in cabinet
  - Fit-up into vertical test-stand
  - Fit-up in the 120C baking chamber
- Start developing procedures for assembly, degreasing, HPR and vertical testing (IP3I)
- Start ordering hardware for assembly (seals, bolts, feedthru ect.)
- Evaluate RF test system and modify VCO system to operate at 1.3 GHz
  - Evaluate RF power available with existing amplifier
- Start process evaluation with S35 cavity

Questions:

  - How many cavities should we expect this FY, when should we expect them?
    - What is the status of cavities at Cornell?
  - What does the surface removal mean with respect to the Phase A requirements, damaged layer removal by EP or BCP?
  - Will we test with HOM probes? If so we do not have any!
  - How many of the cavities will need heat-treatment and can you identify which ones
  - Is there a plan for fabricating aluminum seals for these cavities to support all projects
  - What is expected for the delivery of cavities
    - Under vacuum for string assembly, valves needed for each cavity or blanked?
  - What torque values are used for seals and is standard hardware used (part list needed)
  - What is the repair process on a damaged flange?

Jlab Short term goals:

- Develop some statistics on RF performance variability with subset of procedures (assembly and HPR) with no chemistry
- In parallel modify EP system for this cavity and debug system processes
- Start exercising processes and facilities

Discussion:

- It seems important to set some short term milestones for this effort that we are both comfortable with and progresses towards what is needed in this FY year
- I see an opportunity to gain some knowledge on non chemistry processes with respect to reproducibility if a cavity becomes available through this FY before any EP is applied.
    - The S35 9-cell cavity I believe quenches at 23MV/m
    - If we don't do this we will have a hard time understanding EP process variability. If all cavities are needed quickly it will be hard to develop EP procedures